

APPENDIX A

OUTLINE OF WMO BULLETIN HEADERS

USED WITH

NCEP GRIB

WMO BULLETIN HEADER

The WMO abbreviated heading is used to identify the NCEP GRIB messages; however, it is not a complete description of their content. The user is cautioned against using the header as the sole determiner of the record content; one should, of course, rely on the Product Definition Section for that purpose.

Note: In the following, a hexadecimal number is enclosed in parentheses followed by the designation "hex".

The information needed to identify the NCEP product is contained in 21 octets. The characters are encoded using the CCITT-ITA No. 5, also known (in the US) as ASCII characters, and are defined as follows:

Octet no.	Header Content
1	The character 'H' for GRIB bulletins sent to the NWS Family of Services, used for the WAFS program, and for general International Exchange or The character 'O' for oceanographic GRIB bulletins intended for general International and National Exchange and for use in the NWS AWIPS program or The characters <u>'L'</u> , <u>'M'</u> , 'Y' or 'Z' for meteorological GRIB bulletins intended for the NWS AWIPS program.
2	A letter character specifying the type parameter as shown in Table A.1.
3	A letter character specifying the grid area as defined in Table A.2.
4	A letter or numeric character indicating the time difference between the reference time and valid time of the data as listed in Table A.3, i.e., the forecast length.
5-6	Numeric characters as defined in Table A.4. Usually the pressure level, sometimes just a sequence number. Some values have special level or layer meanings.
7	Blank (20)hex
8-11	Four characters identifying the originating center. The first three characters are always 'KWB' for NCEP-produced messages. The last character is a letter specifying the NCEP model as defined in Table A.5.
12	Blank (20)hex

- 13-14 Two numeric characters providing the reference day of the month (01-31) of the data.
- 15-18 Four numeric characters providing the reference hour and minute of the data.
- 19-22 Four OPTIONAL characters: one blank (20)hex, then 'Pxx', where xx=AA, AB, AC ... AY,AZ, BA, BB, BC ... etc. Used to indicate sequential parts of a very long message that has been subdivided. The **last** part of the message will have xx=Zn, where n is the next letter in the appropriate sequence. Example: a five part message would have the parts indicated by PAA, PAB, PAC, PAD, PZE.
- 19-21 or 23-25 Two ASCII carriage returns and a line feed, (0D0D0A)hex.

The first six characters are commonly referred to as:

$T_1 T_2 A_1 A_2 ii$

In summary...

Generic Meaning of $T_1 T_2 A_1 A_2 ii$:

- T_1 : Type of bulletin: "H" for GRIB messages for Family of Services, WAFS, and International Exchange;
 "O" for Oceanographic GRIB messages for National and International Exchange and for AWIPS GRIB messages; or
 "Y" or "Z" for AWIPS GRIB messages
- T_2 : Type of data/parameter
- A_1 : Grid
- A_2 : Analysis or forecast hour
- ii : Numeric. Usually the pressure level, sometimes just a sequence number. Some values have special level or layer meanings.

In the following tables, the columns headed AWIPS are augmentations to the common Family of Services (FOS), National, and International Exchange variables. FOS, National and International GRIB messages (with H as the initial character) draw upon the left hand columns only. National, International, and AWIPS GRIB messages (with O as the initial character) draw

upon the middle column only. AWIPS GRIB messages (with Y or Z as the initial character) use letters from both the left and right columns. If each column contains entries for the same designator, the T₁ character (H, O, Y, or Z) indicates which entry to use.

TABLE A.1 TYPE PARAMETERS - T₂
(Header Octet 2)

Designator	PARAMETER		
	FOS & International (H)	AWIPS (O)	AWIPS (<u>L, M,</u> Y or Z)
A		U-wind/current component	Cloud of non-conforming ICWF* parameters
B		V-wind/current component	Vertical Wind Shear
C	Vorticity	Total Significant Wave Height	Vorticity
D		Depth	Probability Parameters
E	Total Precipitation	Ice Concentration	
F	Long Wave Radiation	Ice Thickness	Precipitable Water
G	Convective Precipitation	Ice Drift	
H	Height (geopotential)	Ice Growth	
I		Ice Convergence	Non-Convective Precipitation
J	Significant Wave Height	Period of Spectral Peak of the Ocean Waves	Precipitation Rate
K	Primary Wave Period	Direction of Spectral Peak of the Ocean Waves	Visability
L	Primary Wave Direction	Height of Significant Wind Waves	Soil Parameters
M	Secondary Wave Period	Mean Period of Wind Waves	<u>Catagorical Parameters (yes/no)</u>
N	Secondary Wave Direction	Mean Direction of Wind Waves	
O	Vertical Velocity	Height of Significant Swell Waves	

P	Pressure	Mean Direction of Swell Waves	
Q		Wind Speed	Stability Index
R	Relative Humidity	Wind Direction	
S	Snow	Salinity	Snow Parameters
T	Air Temperature	Ocean Temperature	
U	U Wind Component	Vessel Icing	U-Component of Storm Motion
V	V Wind Component	Visibility	V-Component of Storm Motion
W		Ocean Temperature Warming	CAPE
X	Surface Lifted Index	Mixed Data	Surface Parameters
Y	UV Index	Mean Period of Swell Waves	CIN
Z	Refer to GRIB PDS	Refer to GRIB PDS	Helicity

* Surface wind direction, surface wind speed, surface dew-point temperature, maximum surface temperature, and minimum surface temperature

TABLE A.2 GRID DESIGNATOR - A₁ (Header Octet 3)

Designator	Grid Number (See Table B)		
	FOS and International (H)	AWIPS (O)	AWIPS (<u>L, M</u> , Y or Z)
A	21	228 - 2.5x2.5 deg lat/lon global	201 - 381 km Northern Hemisphere
B	22	218 - 12-km CONUS	218 - 12-km CONUS
C	23	219 - N. Hemisphere High Res	175 - 10 km lat/lon Guam
D	24	220 - S. Hemisphere High Res	250 - 8 km lat/lon Hawaii
E	25	221 - N. American High Res	<u>185 - 12 km CONUS (DGEX)</u>
F	26	229 - 1.0x1.0 deg lat/lon global	<u>186 - 12 km Alaska (DGEX)</u>
G	50	230 - 0.5x0.5 deg lat/lon global	
H		231 - 0.5x0.5 deg lat/lon N.H.	213 - 95 km CONUS
I	37	232 - 1.0x1.0 deg lat/lon N.H.	202 - 191 km CONUS
J	38	233 - 1.25x1.00 deg lat/lon global	203 - 191 km Alaska
K	39	234 - 0.25x0.25 deg lat/lon ECGM regional	204 - 160 km Hawaii
L	40	235 - 0.5x0.5 deg lat/lon global	205 - 191 km Puerto Rico
M	41	238 - Western North Atlantic lat/lon	226 - 10 km CONUS
N	42	239 - Alaska Regional lat/lon	207 - 95 km Alaska
O	43	244 - North Atlantic lat/lon	208 - 80 km Hawaii
P	44	251 - COFS lat/lon	237 - 32 km Puerto Rico
Q		253 - Eastern North Pacific lat/lon	211 - 80 km CONUS

R		212 - 40 km CONUS	212 - 40 km CONUS
S		253 - Eastern North Pacific lat/lon	242 - 11.25 km Alaska
T	61	214 - 48 km Alaska	
U	62	215 - 20 km CONUS	215 - 20 km CONUS
V	63	216 - 45 km Alaska	216 - 45 km Alaska
W	64		236 - 40 km CONUS
X	(Used for experimental transmissions)		
Y			217 - 22 km Alaska
Z	Refer to GRIB PDS		

Table A.3 FORECAST HOUR DESIGNATOR
(Header Octet 4)

DESIGNATOR	FORECAST HOUR			
	FOS, International (H) and AWIPS (<u>L</u> or Y)	National, International (O) and AWIPS (O)		AWIPS (<u>M</u> or Z)
		Octet 8-11 = KWBM or KWBP	Octet 8-11 = KWBJ	
A	00 hour analysis	00 hour analysis	00 hour analysis	02 hour fest
B	06 hour fest	12 hour fest	03 hour fest	03 hour fest
C	12 hour fest	24 hour fest	06 hour fest	04 hour fest
D	18 hour fest	36 hour fest	09 hour fest	08 hour fest
E	24 hour fest	48 hour fest	12 hour fest	09 hour fest
F	30 hour fest	60 hour fest	15 hour fest	10 hour fest
G	36 hour fest	72 hour fest	18 hour fest	14 hour fest
H	42 hour fest	84 hour fest	21 hour fest	15 hour fest
I	48 hour fest	96 hour fest	24 hour fest	16 hour fest
J	60 hour fest	108 hour fest	30 hour fest	20 hour fest
K	72 hour fest	120 hour fest	36 hour fest	21 hour fest
L	84 hour fest	144 hour fest	42 hour fest	27 hour fest
M	96 hour fest	168 hour fest	48 hour fest	54 hour fest
N	108 hour fest	192 hour fest	60 hour fest	66 hour fest
O	120 hour fest	216 hour fest	72 hour fest	33 hour fest
P	132 hour fest	240 hour fest	84 hour fest	39 hour fest
Q	144 hour fest	264 hour fest	96 hour fest	45 hour fest
R	156 hour fest	288 hour fest	120 hour fest	51 hour fest
S	168 hour fest	312 hour fest	132 hour fest	57 hour fest
T	180 hour fest	336 hour fest	144 hour fest	78 hour fest
U	192 hour fest	360 hour fest	156 hour fest	90 hour fest
V	204 hour fest	384 hour fest	168 hour fest	102 hour fest
W	216 hour fest	-	-	114 hour fest

X	228 hour fcst	-	54 hour fcst	-
Y	240 hour fcst	-	66 hour fcst	-
Z	Reserved for special purposes	-	108 hour fcst	Refer to GRIB PDS

The WMO headings for Eta model products generated on grid 237 (Puerto Rico) and RUC model products generated on grid 236 (CONUS 40 km) use a special table for the FORECAST HOUR DESIGNATOR - A₂ (Header Octet 4).

This table is defined as follows:

DESIGNATOR	FORECAST HOUR AWIPS (Y or Z)	DESIGNATOR	FORECAST HOUR AWIPS (Y or Z)
A	00 Hour Analysis	N	18 Hour Forecast
B	01 Hour Forecast	O	24 Hour Forecast
C	02 Hour Forecast	P	30 Hour Forecast
D	03 Hour Forecast	Q	36 Hour Forecast
E	04 Hour Forecast	R	42 Hour Forecast
F	05 Hour Forecast	S	48 Hour Forecast
G	06 Hour Forecast	T	60 Hour Forecast
H	07 Hour Forecast	U	72 Hour Forecast
I	08 Hour Forecast	V	84 Hour Forecast
J	09 Hour Forecast	W	96 Hour Forecast
K	10 Hour Forecast	X	108 Hour Forecast
L	11 Hour Forecast	Y	120 Hour Forecast
M	12 Hour Forecast	Z	Refer to GRIB PDS

This particular table is maintained by the NWS Office of the Chief Information Officer and can be found online at:

<http://www.weather.gov/tg/tablec10.html>

TABLE A.4 LEVEL DESIGNATORS - ii
(Header Octets 5 and 6)
(H, O, Y, or Z)

The following version of Table A.4 contains changes implemented by the WMO on November 3, 1993. Unless indicated in Table A.4 below, the designator given is the hundreds

and tens digits of the hPa level in the atmosphere, e.g. 70=700hPa; 03=30hPa, etc.

DESIGNATOR	LEVEL or LAYER
99	1000 hPa
98	Air Properties at the Surface of Earth
97	Level of the Tropopause
96	Level of the Maximum Wind
94	Level of the 0 deg. C isotherm
93	975 hPa
92	925 hPa
91	875 hPa
89	Any Parameter Reduced to Sea Level
88	Land/Water Properties at the Surface of the Earth/Ocean
87	1000-500 hPa thickness
86	Boundary Layer
82	825 hPa
77	775 hPa
74	Cloud Top Level
72	725 hPa
67	675 hPa
62	625 hPa
57	575 hPa
52	525 hPa
47	475 hPa
42	425 hPa
37	375 hPa
32	325 hPa

27	275 hPa
22	225 hPa
17	175 hPa
12	125 hPa
01	Refer to GRIB PDS
Note: The following levels are used to indicate geometric height for aviation flight levels, not pressure levels	
81	6000 ft FL (approximately 810 hPa)
73	9000 ft FL (approximately 730 hPa)
64	12000 ft FL (approximately 640 hPa)
51	18000 ft FL (approximately 510 hPa)

TABLE A.5 MODEL IDENTIFIERS
(Header Octet 11)

All NCEP GRIB products have a CCCC that starts with KWB. The fourth letter of this identifier is defined as follows.

DESIGNATOR	NCEP MODEL
A-B	Reserved for Future Use
C	Global Forecast System Model
D	<u>Downscaled GFS using Eta eXtension (DGEX)</u>
E	Eta Model
F	Nested Grid Model
G	Rapid Update Cycle
H	Medium Range Forecast Model
I	Sea Surface Temperature Analysis
J	Wind-Wave Forecast Model
K	Global Ensemble Forecasts
L	Regional Ensemble Forecasts
M	Ocean Models
N	Used by NDFD Program
O	Merge of Models
P	EPA/CMAQ
Q-Y	Reserved for Future Use
Z	Refer to GRIB PDS